THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

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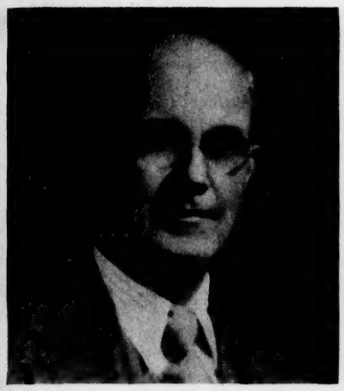
W. S. Bidle Dies, Was Past President A.S.M.



W. S. Bidle
President, A.S.M., 1924-25

William Sanford Bidle, a past president of the American Society for Metals (then the American Society for Steel Treating) and charter member of the Cleveland Chapter, died suddenly at his home in Cleveland on May 11.

Mr. Bidle has been president of the W. S. Bidle Co. of Cleveland, commercial steel treaters, since 1913.

He was born in Cleveland June 26, 1872, received a B.S. degree from Case School of Applied Science in 1893 and M.F. degree in 1898. He was a member of Tau Beta Pi and Sigma Xi fraternities.

From 1896 to 1912 he was manager of the turn-buckle department of the Cleveland City Forge and Iron Co.

Mr. Bidle was a past chairman of the Cleveland Chapter A.S.M., national treasurer of the Society in 1920-21, second vice-president in 1922-23, first vice-president in 1923-24, and national president in 1924-25.

Talk on Modern Welding Stresses Aircraft Uses

Reported by J. T. Ballard
Salesman, Quaker Chemical Products Corp.

Hartford Chapter—They all grinned when Bill Richardson got up to speak on his hobby of making fish "poles", as was announced. But grins soon turned to applause as Bill warmed to his subject and later passed around the tables samples, some finished, some in the making, of the fine bamboo fly rods he makes in his spare time. In other words, he gave an excellent coffee talk on his hobby at the April dinner before the regular meeting.

The speaker of the evening was George N. Sieger, president of the S-M-S Corp., Detroit. His talk on "Modern Welding", beautifully interspersed with down-to-earth asides, first took his audience back a few years to early welding practice. As his talk progressed, he brought us right up to the minute on what is going on in welding today.

Aircraft welding was adequately stressed and his talk ended by describing in detail the advantages and savings to be effected by "condenser welding" equipment.

A lively question period supplemented his talk, proving not only that our speaker had a vastly interesting and important subject but also that he was well versed in it.

Covers Broad Field of Gases And Containers

Reported by D. M. Horner
Control Supervisor, Harrisburg Steel Corp.

York Chapter—following the annual custom of having a Chapter member present the technical paper at the Gettysburg meeting, A. Floyd Whalen, chief chemist and metallurgist of the Harrisburg Steel Corp. and past Chapter chairman, talked on "Romance in Gas" on March 12th at Gettysburg.

Dr. Allen Sloat, of the faculty at Gettysburg, arranged to have the laboratories open for inspection and his students were guests of the Chapter at the meeting.

Mr. Whalen covered the development and uses of commercial gases and the cylinders used as containers for their transportation. He told how the electrolytic method of making liquid chlorine made possible cheap newspapers, practically eliminated typhoid fever, and permitted establishment of rayon and textile bleaching industries.

The hydrogen obtained from this same process was combined with nitrogen to form synthetic ammonia for use as a refrigerant and a commercial fertilizer. This greatly relieved the load on the nitrate deposits of Chile, which economists of 40 years ago predicted would be exhausted by 1931.

Nitrogen, oxygen and the inert gases are obtained from the fractional distillation of liquid air. A nitrogen application of prime importance today is in trinitrotoluol, or TNT.

Oxygen is probably the most important gas economically today. Its use as a medical gas saves thousands of lives annually and its use in oxy-acetylene welding for repair purposes only is estimated to save about $800,000,000 annually.

Helium is the most useful of the inert gases, not only because of its use in dirigibles, but as a substitute for nitrogen in the air pumped to deep sea divers, permitting an increase from 60 ft. to 405 ft. in the depth at which they can work.

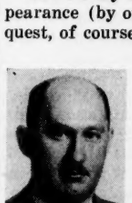
Carbon dioxide, next to oxygen, is

(Continued on page 8)

Iron and Steel Studied in Spring Course

Reported by Fred P. Peters
Assistant Editor, Metals and Alloys

New Jersey Chapter—In a return appearance (by overwhelming popular request, of course) Dr. Norman E. Woldman, chief metallurgical engineer of Eclipse Div., Bendix Aviation Corp., presented New Jersey Chapter's spring educational course in "four" lectures at the Essex House, Newark, on Monday evenings in January, February and March.



N. E. Woldman

The Spring course was a carefully planned sequel to John Queen's Fall course—"Introduction to Practical Metallurgy"—and drew heavily on Dr. Woldman's knowledge of and experience with the microstructure, properties and uses of all types of irons and steels.

Four lectures were scheduled, but a bad storm the night of the first session prevented so many from attending that this lecture (on pure iron and iron-carbon alloys) was repeated as a fifth lecture, with the largest "class" of the course—237 knowledge-thirsty metal men—in attendance.

The average attendance of the four well-attended lectures was 209, and the course was unique in that there was no falling-off in numbers present as the course progressed. This was, of course, gratifying to the Chapter officers and to S. Skowronski, educational committee chairman, but it had the most enervating effect of all on Dr. Woldman, who took unto himself a wife just a few days after his last lecture.

The Chapter, in wishing him every blessing, is happy in the knowledge that at last someone can ask Dr. Woldman questions he can't answer.

Rochester Host to Six Chapters In Regional Meeting April 18-19

Four Technical Sessions Are Followed by Dinner Dance Saturday Evening

Reported by George E. Burkhardt
Engineer, General Railway Signal Co.

Rochester Chapter—The Second Regional Meeting of the Rochester Chapter jointly with Buffalo, Ontario, Syracuse, Northwestern Pennsylvania and Southern Tier Chapters was held at University of Rochester, River Campus, on Friday and Saturday, April 18 and 19.

The meeting was opened on Friday morning with a lecture on "The Use of Radio-Active Materials in Tracing Disease" by Dr. William F. Bale of the University of Rochester School of Medicine and Dentistry.

Following the lecture the group was conducted through the various departments of the school, where the use and application of various types of electro-mechanical apparatus was explained and demonstrated by the respective department heads.

Dr. Stafford Warren, head of the Department of Radiology, generalized briefly on the work and accomplishments of his department.

Finley and Weldon Speak

Two papers were presented on Friday afternoon, the first of which was entitled "Cold Working of Stainless Steel" by J. K. Findley, Allegheny Ludlum Steel Corp. He pointed out that the major problems are with dies and lubrication for cold-drawn sections.

"Grain Size and the Mechanical Properties of High Speed Steels" by M. J. Weldon, Crucible Steel Co. of America,

(Continued on page 7)

Nominations for A.S.M. National Officers Are Announced by Committee

IN ACCORDANCE with the Constitution of the American Society for Metals, the Nominating Committee appointed by President Oscar E. Harder has made the following nominations for officers:

President (1 year)—Bradley Stoughton, Dean of Engineering, Lehigh University, Bethlehem, Pa.

Vice-President (1 year)—H. J. French, In Charge of Alloy Steel and Iron Development, International Nickel Co., New York.

Treasurer (2 years)—Francis B. Foley, Superintendent of Research, the Midvale Co., Philadelphia.

Trustees (2 years)—Norman F. Tisdale, Metallurgist, Molybdenum Corp. of America, Pittsburgh, and Kent R. Van Horn, Research Metallurgist, Aluminum Co. of America, Cleveland.

The Nominating Committee consists of John W. Worsch, chairman; Henry J. Fischbeck, Arthur E. Focke, W. R. Frazer, H. S. Jerabek, C. R. Whittemore, and C. R. Wiggins.

Tri-City Has Election, Movie

Reported by James C. Erickson
Deere & Co.

Tri-City Chapter—Eighty-five members were present at the annual "election of officers" on April 8, held at the Farmall Club, Rock Island, Ill.

The new officers and executive committee will be published in the August issue of THE REVIEW.

The motion picture entitled "The Making and Shaping of Steel" was shown previous to the election. After the business meeting, the members feasted around a "Smorgasbord".

Compliments

To **R. Walter Dietrich**, Baltimore manager and sales engineer for the Rustless Iron and Steel Corp., on his election as president of the Steel Club of Baltimore, Inc. Walter was instrumental in the formation of the Baltimore Chapter A.S.M. at the time he was chairman of the Washington-Baltimore Chapter in 1931-32.

To the **Detroit Chapter** and E. L. Morrison's membership committee (with an assist for the national defense program) on being the first A.S.M. Chapter to exceed 1000 paid members in a single year.

To **H. W. Graham**, director of research for Jones & Laughlin Steel Corp., Pittsburgh, on being named chairman of the Committee on Iron and Steel of the National Research Council's South American Committee. This committee will prepare a report for the Council to be submitted to Jesse Jones, Secretary of Commerce, covering its recent visit to South American countries.

To the **Columbus Chapter** for its broadcast on "Strategic Metals" given by Secretary R. E. Christin over Station WBNS on April 1—and no April Fool!

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OSCAR E. HARDER, *President*
BRADLEY STOUGHTON, *Vice-President*
W. H. EISENMAN, *Secretary*
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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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President Harder Makes Radio Debut On Baltimore Station

Reported by R. C. Dalzell
Revere Copper & Brass, Inc.

Baltimore Chapter—Making his initial appearance before the microphone, on April 21 President O. E. Harder addressed a radio audience estimated to be from 88 to 120,000 people at Baltimore. This estimation is derived as follows:

At 6:15 P. M. 88 members of the Baltimore Chapter were assembled at the Engineers' Club, listening to the interview on "Strategic Metals in National Defense" over WFBR. Advance advertising by specially printed posters reached 40,000 families through wage earners employed in plants producing or using metals in the Baltimore area. Assuming only three persons per family, we thus get 120,000 as the maximum probable listening audience.

Dr. Harder proved to have a splendid radio voice, and he was paid the crowning compliment to the effect that "it didn't sound as though it was read."

Rushing from the broadcasting studio to the Engineers' Club, Dr. Harder joined the members for cocktails and dinner preceding the 8 o'clock meeting. In his very interesting talk "Recent Developments in Metallurgy" Dr. Harder covered a broad field. Discussion after the talk was active.

President's Night Is Held In Canton on April 24

Reported by J. M. Gotshall
Ass't Chief Chemist, Timken Steel and Tube Division

Canton-Massillon Chapter—National President's Night was celebrated April 24 at a dinner meeting, after which O. E. Harder, national president and assistant director of Battelle Memorial Institute, addressed the group on "Recent Metallurgical Developments".

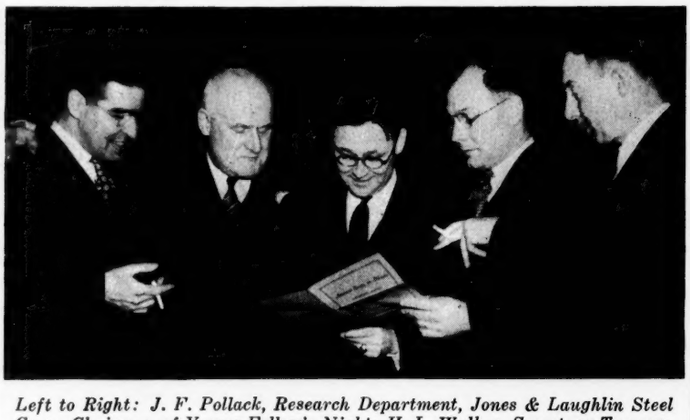
Dr. Harder gave a brief history of metallurgy, illustrated with slides. At the end an excellent idea of the capabilities of the speaker as a deep sea fisherman could be formed from various pictures of large fish caught by him in the waters around Florida.

The coffee talk by A. C. L. Barthlemeh, Stark County's Prosecuting Attorney, on "Watch Your Pocket-Book" immediately followed the dinner.

Karl F. Schmidt, vice-chairman, was in charge of the meeting.

Manufacture of Garrand Rifle Described

Pittsburgh Officials Look Over Program



Left to Right: J. F. Pollack, Research Department, Jones & Laughlin Steel Corp., Chairman of Young Fellow's Night; H. L. Walker, Secretary-Treasurer, Pittsburgh Chapter; Lt. Col. J. L. Guion, Executive Officer, Pittsburgh Ordnance District, Speaker of the Evening; L. C. Whitney, Chief Metallurgist, Copperweld Steel Co., Vice-Chairman; and F. H. Allison, Jr., Metallurgist, United Engineering & Foundry Co., Chairman of the Pittsburgh Chapter.

Ordnance Problems Are Discussed at Young Fellows' Night

Reported by W. L. Witney
Assistant Chief Industrial Engineer, Jones & Laughlin Steel Corp.

Pittsburgh Chapter—"Young Fellows Night" on March 13 turned out to be one of the most successful programs that the members have attended.

As a coffee talker, the ubiquitous Luke Barnett, rubber extraordinary, was introduced as Stanislov Przmyslovskis of the Skoda Munitions Works, Czechoslovakia.

He gave the boys a good idea of the thoroughness of the metallurgical training in his country and the excellent steel they manufacture as compared to that produced in America. In fact he did it so well that he was almost tossed out the door.

The main speaker of the evening, Lt. Col. J. L. Guion, executive officer, Pittsburgh Ordnance District, discussed the problems encountered in the production of ordnance materials and the responsibilities metallurgists have in helping the national defense program.

Good Steel Necessary

The necessity for good steel for ordnance materials was stressed from the standpoint of the effect that failures have on the morale of the fighting forces.

Simplification of specifications with a view toward telling more of what was wanted and less of how to make the steel has been one of the Ordnance Department's aims.

The necessity for maximum strength and ductility so that the weight of equipment can be reduced and thereby increase mobility is of prime importance. Macro examination, welding of parts and improvements in projectiles and guns were well covered.

The talk was followed by a lively discussion, showing the appreciation of Lt. Col. Guion's efforts to discuss fully the mutual problem of national defense and the general willingness and desire on the part of Pittsburgh metallurgists to be fully informed and do their part.

Midvale Representative Dies

JOHN C. GLASS, district manager of The Midvale Co., with headquarters in Chicago, died on May 8 after a prolonged illness.

Heat Treat Problems Solved in the Shop

Reported by R. W. Weld
Service Engineer, Claud S. Gordon Co.

Indianapolis Chapter—An informal discussion on a practical angle of heat treating difficulties arising in the shop was the contribution of R. D. Allen, Republic Steel Corp., to the April meeting.

Mr. Allen gave examples from his experiences as metallurgical trouble shooter to illustrate that the answer to many heat treating problems is to be found in the shop and not in the laboratory. Common errors in testing equipment and testing practice, steel selection, quenching, carburizing, and design were specific examples.

Open discussion, after the lecture, was lively as the members put their own problems to Mr. Allen for comment. The lecture drew praise from both metallurgists and shop men for its practical value and general interest.

In a business meeting preceding the technical session members discussed the proposed constitution for the local Chapter, and the nominating committee was named by Chairman P. B. Jensen. Harold Lurie acted as technical chairman for Mr. Allen's lecture.

York Has Ladies' Night With Dancing and Cards

Reported by D. M. Horner
Control Supervisor, Harrisburg Steel Corp.

York Chapter—Annual Ladies Night held at the Outdoor Country Club in York April 23 was thoroughly enjoyed by the 75 or more members and guests present.

An excellent dinner, during which corsages were distributed to the ladies, was followed by dancing and cards, with plenty of prizes. Mrs. Floyd Whalen finally nosed out Mrs. H. M. Reeser for the ladies' first prize in contract bridge after a seesaw battle.

Practically everybody took advantage of the dancing, in which a novelty item arranged by Bill and Charlie Feiser was a balloon dance, with tickets for prizes in several of the hundred or so balloons released. (It was noted that Bill Allen leads a snappy Paul Jones.)

The committee did a fine job, and now we know that the ladies feel this is not such a bad organization after all, even if it does mean at least one more night out a month for the men!

Assembly and Operation Are Demonstrated

Reported by Walter M. Saunders, Jr.
Consulting Chemist and Metallurgist

Rhode Island Chapter—The fact that the inventor of the Garrand rifle received his early mechanical training in Brown & Sharpe Mfg. Co. in Providence was almost sufficient assurance that the April 3rd meeting would be a success.

What made it a success, however, was the talk given by E. L. Wood, metallurgist of the Springfield Armory, where the rifle is being made. The title was "Metallurgical Problems Encountered in the Manufacture of the Garrand Rifle."

Assisting Mr. Wood, and demonstrating the ease of assembly, and other operating characteristics of the rifle, A. L. Woodworth, of the ballistics department, ably held his own under a barrage of critical and questioning remarks.

The rifle is safe, accurate and reliable, and its acceptance by various branches of the armed forces of the United States is good verification of this fact. Although the original rifle met all the requirements of a critical Army Board, a number of improvements have been made, most of them in the direction of facilitating manufacture.

"Kick" Is Reduced

For the benefit of those who, like this reporter, think in terms of the 12-gage double-barreled shot gun, the Garrand rifle is classed as a gas-operated semi-automatic.

In the Garrand Rifle, although the total energy of recoil is probably not far different from that of the Springfield, the effective "kick" is very considerably reduced. This is partially due to the dissipation of some of the energy in operating the mechanism.

Pressure of the explosion unlocks the bolt, the bolt travels rearward, ejecting the empty case, and cocking the hammer, after which spring pressure returns the action to the closed position with a fresh cartridge in the chamber, and the arm is ready for the succeeding shot.

Since the gas port is very close to the muzzle, the projectile must have left the barrel by the time the gases start the unlocking action.

Many Parts Case Hardened

Metallurgical features of the barrel, piston, gas chamber, and clip were described by Mr. Wood, who gave the types of steels used, and their heat treatments.

A great many parts are case hardened, in both rotary carburizers and salts, and advantage has been taken of all kinds of operating economies, which have greatly reduced production cost.

In spite of the popular conception, the Army is exceedingly cost conscious, and tries to save money wherever possible according to Mr. Wood, who told of reducing the cost of the clip approximately 80%.

Careful control of heat treating is evidenced by the forge furnaces which are under automatic control.

For the coffee talk at the dinner preceding the meeting, the New England Telephone and Telegraph Co. showed several short reels of motion pictures, which described many features of telephone operation and cable construction about which little is generally known.

Speakers' Table at Dayton Tri-Chapter Luncheon

A Luncheon at the Engineers Club Featured the Tri-Chapter Meeting April 16. Photographed are, left to right: Dayton Treasurer S. R. Prance, Speaker W. E. Jominy, Dayton Vice-Chairman J. W. Carl, Speaker Norman I. Stotz, Chairman Harold W. Faulkender, Speaker Frank R. Palmer, Secretary I. J. Rapp, and Speakers Burns George and W. H. Wills.

Nitrogen Cited as Most Influential Single Element in Steel in Talk on Strain Aging

Reported by Walter G. Patton
Engineer, Climax Molybdenum Co.

Detroit Chapter—One of the warmest April 14's the city fathers can remember was chosen to hear C. L. Altenburger, of the Great Lakes Steel Corp., discuss the subject of strain aging and related phenomena.

At the outset, the speaker explained that the subject of strain aging is one of special interest in deep drawing steels, although the properties of constructional steels are also significantly influenced by aging phenomena.

The speaker's company conducted a long series of experiments comparing tensile strength and ductility of a wide variety of steels at room temperature and in the blue brittle range. Where the steels investigated were unstable, they were subject to embrittlement at a range of temperatures.

Nitrogen Raises Tensile

The most important contributing factor in blue brittleness, Mr. Altenburger told his listeners, is nitrogen. By purposely infecting a steel with an overdose of nitrogen, it is possible to raise the tensile strength as much as 39,000 psi. at about 400° F. in the presence of only 0.010% N (and reduce the ductility by an appropriate amount). On this basis, it may be said the nitrogen can become the most influential single element present in steel.

Three elements are commonly used to "fix" the nitrogen content of steel—aluminum, zirconium and titanium. It was pointed out that the capacity of each of these "fixing agents" is characteristic of the element; the blue brittle area will vary over a considerable range of temperatures, depending upon the composition and other factors.

Mr. Altenburger stated that the form nitrogen takes in steel has not yet been discovered—it may be present as a simple component or a highly complex compound of iron, carbon, nitrogen and possibly other elements.

While the behavior of nitrogen alone in steel cannot account for McQuaid-Ehn grain size phenomena, grain size definitely appears to be associated in some manner with nitrogen content. In experimental heats, it has been possible to control grain size within certain limits by controlling nitrogen content and nitrogen combining elements.

During the question period directed by M. L. Frey, technical chairman, it was brought out that while tensile strength and ductility are markedly influenced by nitrogen content, there is yet no indication that yield point is materially influenced. To some extent, the difficulty of measuring yield point may be a factor here.

Explains Galvanic Corrosion

Reported by F. N. Meyer
Technical Supervisor, Waterbury Branch American Brass Co.

New Haven Chapter — The April meeting was held at the auditorium of the Connecticut Light & Power Co., Waterbury. The speaker was F. L. LaQue of the International Nickel Co.

The meeting was preceded by a dinner at the Hotel Elton, and Mr. La Que's subject, "Some Notes on Galvanic Corrosion" attracted a large and enthusiastic audience. His talk was reviewed in the April issue.

John R. Freeman, Jr., technical manager of the American Brass Co., acted as technical chairman.

Fatigue Properties of Non-Ferrous Metals Vary Widely in Tests

Reported by F. N. Meyer
Technical Supervisor, Waterbury Branch American Brass Co.

New Haven Chapter—At the March meeting held in Bridgeport, Conn., the speaker was J. R. Townsend, materials and standards engineer, Bell Telephone Laboratories, New York City.

Mr. Townsend's subject, "Fatigue and its Relation to Mechanical and Metallurgical Properties of Metals", proved to be timely and interesting.

Laboratory tests on four compositions of brass, two compositions of nickel-silver, two compositions of phosphor bronze, Everdur, beryllium-copper alloys, nickel and monel metal, indicate that the fatigue properties of non-ferrous metals vary widely.

The effect of grain direction, grain size, nature of surface, such as mill finish and polish, indicates that a polished surface offers the best fatigue endurance.

Degree of cold work affects the fatigue and some of the metals develop their maximum endurance at 5 numbers instead of 7 or 8 numbers hard.

No satisfactory short-time fatigue test has thus far been developed and it is necessary to carry out full-time tests in order to determine fatigue characteristics.

From the point of view of the designer, the ability of a metal to withstand static loading (creep) for a long period is important as well as ability to withstand repeated stressing (dynamic testing) or fatigue tests.

It was explained that the Goodman diagram, which gives the ability of a metal to withstand all degrees of reversal of stress from non-reversal to complete reversal, is essential for complete design information.

Tests are under way to determine Goodman diagrams and creep limits for all non-ferrous metals to provide a comprehensive basis for design of telephone apparatus springs.

Questions of High Temperature and Pressure Answered By Valve Research

Reported by H. R. Boatman
Metallurgist, Inland Steel Co.

Calumet Chapter — "What analysis would you recommend for an alloy steel which would withstand 4000 psi. stress at 1200° F?"

The answer to this and many other questions on performance of valves under high pressure and high temperature was given by J. J. Kanter, research metallurgist of the Crane Co., in his address before the Chapter on "Trends of Research in Valve Manufacture" on March 18.

Mr. Kanter covered the field of valve manufacture, including the intelligent design of castings through the aid of X-ray and Gamma-ray examination, spectographic analysis, creep strength at elevated temperatures, and dilatometric study of behavior in heating and cooling. Final testing requires checking the valves under operating conditions.

In his discussion of alloys suitable for service at high temperature and pressure, the speaker ruled out ordinary cast iron because of its growth at elevated temperatures due to graphitization. The 18-8 type of stainless steel was found to fail under creep test by carbide precipitation resulting in rupture in the grain boundaries.

He stated that 4 to 6% chromium-molybdenum alloy steels have been found very satisfactory in high temperature mildly corrosive service.

Welding is sometimes used in the assembly and installation of large valves where it is found impractical to use bolts in the joining of flanges. Such welds are made only by men who have passed qualification tests. All alloy steel welds are stress relieved.

Valve disk failure by corrosion and erosion presents a very interesting problem. It was disclosed, for example, that nitrided steel surfaces and other hard but non-corrosion resistant metals are very poor, but that 12% chromium and stellite are very good in resisting steam erosion at high temperature.

Seizure of valve seats, disk guides, and stem threads at elevated temperatures may cause valve failures. This difficulty has been remedied by depositing hard surfacing alloy on the wearing surfaces.

An interesting question which came up in the discussion period was the problem of strain set up in the hard surface deposits on alloy steel because the steel undergoes suppressed transformation while the deposit does not. By the use of dilatometric curves, Mr. Kanter showed that this is taken care of by control of heating and cooling rates after the hard surface deposit has been laid.

Five Men Talk On Tool Steels At Tri-Chapter

Reported by James W. Poynter
Asst. Met., Army Air Corps, Wright Field

Dayton Chapter—The weather man again cooperated with the Columbus, Cincinnati and Dayton Chapters in providing a fine spring day for the annual Tri-Chapter meeting. The Dayton Chapter was host and provided a technical program on the subject of "Tool Steels".

During the morning session, the group heard Norman I. Stotz, metallurgical engineer, Universal Cyclops Steel Co., speak on "Selecting the Proper Tool Steel," and Frank R. Palmer, vice-president, Carpenter Steel Co., discuss "Getting Better Production Through Better Tools".

Luncheon was served in the English Room of the Engineers' Club and an opportunity given to inspect a number of displays.

Among these were exhibits of knives and abrasive wheels by Simonds Worden White Co., powdered metals and products of the Moraine Products Division, General Motors, model shock absorbers and cutaway motors of the Delco Products Division, General Motors, clutch and steering wheel parts of Inland Mfg. Co., and aspects of machining by the Monarch Machine Tool Co.

The afternoon meeting included discussions of "Hardenability of Tool Steels" by W. E. Jominy, metallurgist, Research Laboratories Division, General Motors Corp., "Heat Treatment of Tool Steels" by Burns George, metallurgical engineer, Vanadium-Alloys Steel Co., and "Tool Steel Consumers' Problems" by H. W. Wills, metallurgist, Allegheny-Ludlum Steel Co.

Chairman Faulkender announced that there were approximately 125 registrations for the two sessions.

Two Sustaining Companies Provide Social-Educational Meetings for Cincinnati

Reported by Kurt Siems
Sales Engineer, Cincinnati Milling Machine Co.

Cincinnati Chapter — Through the courtesy of two of its 25 sustaining member companies, the Queen City Supply Co., and the Crucible Steel Co. of America, two auspicious meetings not previously scheduled contributed considerably to steer the 1940-41 season toward a successful conclusion.

These two meetings were of a purely social, but nevertheless educational, character.

On April 18 the showrooms of the Queen City Supply Co. were thrown open and after everyone had his fill of inspecting and playing with the numerous tools and gadgets displayed and asking innumerable questions, all of which were cheerfully answered, two excellent motion pictures on the manufacture of seamless steel tubing and the construction of the Golden Gate Bridge were shown.

Besides valuable souvenirs, an abundant supply of refreshments brought the evening to a successful end.

Of equal caliber was the meeting on May 2 at the Crucible Steel Co.'s Cincinnati warehouse, where Harry Friedlein, district manager, reigned supreme.

Aside from the outstanding picture "The Crucible Process" the remaining features of the evening, including the seemingly inexhaustible supply of refreshments, just about made the whole affair as nearly perfect as one could wish this type of gathering to be.

Joint Meeting Is Held With Welding Society

Reported by R. Lowrey
Metallurgist and Plant Manager
California Steel Treating Corp.

Los Angeles Chapter—A joint dinner meeting with the American Welding Society was held at Scully's Cafe on April 24. The diners were regaled during the meal with singing and music arranged by W. W. Farrar, and afterwards officers for the coming season were elected by both societies.

Chairman Al G. Zima, who presided over the meeting, introduced National Secretary Bill Eisenman, who added to the good humor of the meeting with witty stories and good news regarding the Western Metal Congress.

V. N. Krivobok, who is now director of structural research, Lockheed Aircraft Corp., Burbank, Calif., then presented an "Evaluation of Alloying Elements".

The effect of alloying elements in the annealed state is slight, but when quenched is considerable. Ni, Cr, Mn, and P are difficult to diffuse, and may cause undesirable segregations. Ti, Cb, V, Cr, Mo, and W tend to form carbides, and Al, P, Si, Mn, and B are strongest in strenghtening ferrite.

Molybdenum to Resist Softening

Resistance to tempering is greater if the quenching temperature is high. Molybdenum is tops in resistance to softening in the draw, while tungsten is best to maintain hardness at high temperatures.

Mn, Cr, and V decrease the eutectoid content and refine the structure (not grain refinement). Al, V, Ti, and Zr restrict grain growth.

Mo, W, Mn, and Cr are strongest in conferring hardenability, while those elements which refine the grain are conducive to shallow hardening.

Dr. Krivobok mentioned that we still lack an understanding of the actual cause for the hardening of steel, but did mention that some points are known which bring the solution nearer.

Martensite is hard so long as carbides remain in enforced solution.

Fine Carbides Best for Creep

Critical cooling velocity is the rate at which maximum hardness is obtained, and this decreases as alloy content increases (except cobalt, and up to a certain amount). Rate of diffusion of nickel is 10,000 times slower than carbon, which accounts in part for the capacity of nickel to confer hardenability.

Creep strength depends on resistance to agglomeration and precipitation; therefore a fine dispersion of carbides is best for this service.

Preventing Intergranular Oxidation

It was shown graphically that the tensile strength and cohesive strength are directly correlated to the thickness of the lamellae. The coarse lamellae formed as austenite transform just under 1300° F., being much weaker than finer lamellae formed at lower temperatures, according to work of Dr. Gensamer.

Additions of Cr, Cr-Ni, Cr-Co, Cr-Co-W, Cr-Mo-Co, etc, are made to prevent this intergranular oxidation (within certain temperature limits). Mention of this last brought out a very interesting discussion, participated in by Mr. Maradudin, Mr. Spade and the speaker, regarding intergranular disintegration under stress at elevated temperatures. Agreement was not reached, however, as to whether the initial failure at the surface occurred first due to stress or due to oxidation.

V. N. Krivobok Is Speaker at Los Angeles

At April Meeting of Los Angeles Chapter (Left to Right): W. J. Parsons, Chapter Secretary; J. E. Wilson, Social Relations Committee; A. G. Zima, Retiring Chairman; V. N. Krivobok, Speaker; B. H. Brown, Incoming Chairman.

Nelson's Romantic Story of Stainless Steel Traces Origin and Historical Development

Reported by E. R. Parker
Research Laboratory, General Electric Co.

Schenectady Chapter — A romantic story of stainless steel by T. H. Nelson of the Midvale Co., featured the meeting held at Watervliet Arsenal on March 25.

The discovery of stainless steel cannot be accredited to one man. Elwood Haynes of Kokomo, Ind., was making alloys of nickel, cobalt and chromium; Benno Strauss at Essen, Germany was making iron-chromium-nickel alloys; Harry Brearley in Sheffield, England was experimenting with iron-chromium-carbon alloys for use as gun linings; and P. A. E. Armstrong of Watervliet, N. Y. discovered that silicon-chromium alloys showed exceptional resistance to high temperature oxidation.

Was Associated With Brearley

Stainless steel cutlery was the first material to be popularized. Harry Brearley, working with material for gun barrels, discovered that steels containing from 9 to 16% chromium resisted rusting and staining and were extremely resistant to the corrosive attack of liquid nitric acid.

Dr. Nelson was associated with Brearley at this time and assisted in making and testing some of the first experimental heats of stainless steel. It was noted that the high chromium steels could not be etched with nitric acid and had to be etched with aqua regia.

About 1912 Brearley showed the stainless steel to a Mr. Stewart, cutlery manager of R. J. Mosley's, Sheffield, who used this stainless steel for blades in table knives and registered the trade mark "Rus-Nor-Stain", thus naming the product for the first time.

Brearley's stainless steel patent covered a range of from 9 to 16% chromium and less than 0.70% carbon, but the cutlery quality was made as it is today containing approximately 11 to 13% chromium and 0.20 to 0.30% carbon.

Nickel was added to iron-chromium alloys by Benno Strauss at the Krupp Works in Essen during his search for oxidation resistant materials for pyrometer tubes. Strauss's work eventually led to the development of what is now designated 18-8, a stainless, non-magnetic, austenitic alloy which is practically interchangeable with the ferritic stainless alloys of chromium and iron and which has the advantage of greater ductility, making possible the fabrication of many complicated shapes.

The remainder of the talk was devoted to the gradual evolution in the use of stainless steel, from its small beginnings, through gradually increased use in larger equipment, until today the stainless steels enjoy thousands of uses in airplane, chemical, electrical, automotive, and marine industries.

Each new application involves special problems which must be solved, sometimes by varying the composition slightly, sometimes by varying the manufacturing process. On such problems, many skilled men are now working so that in the future we may expect even greater use of the stainless steels.

Wanted

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Address Box 11-1
American Society for Metals
7301 Euclid Ave. Cleveland, Ohio

American Can Co. Conducts Meeting of Golden Gate Chapter

Reported by W. B. Kennedy
Metallurgist, Columbia Steel Co.

Golden Gate Chapter—Monday, April 21 was designated "American Can Company Night" because the whole program was conducted by the members of the San Francisco branch of that organization.

Dr. B. S. Clark, district manager of the Company's research laboratory, opened the program with a discussion of the part that research has played in the development of the tin can from the early, high-priced, hand-made container, to the cheap, dependable product of today.

While there are not many things as common as a tin can, few realize the enormous amount of money and effort that has been expended in determining such things as the effect of slight changes in the analysis of the steel base, or the results of minute changes in contour of a can seam.

The meeting continued with a talk by Samuel Jacobs, chief machine shop engineer, entitled "The Romance of the Tin Can." Since there are few events in the history of the past century that have not been directly or indirectly affected by the lowly tin can, it can be truly said that it has had a romantic existence.

However, throughout the romantic theme there was woven a story of amazingly accurate machines that are operated at tremendous speeds. The production and maintenance of these machines involves the use of not only a wide range of ferrous and non-ferrous alloys, but a great variety of other materials as well.

Mr. Jacobs presented a very instructive talk on a number of interesting metallurgical and production problems.

The program was concluded by a sound movie entitled "Alaska's Silver Hoards", which dealt with the salmon canning industry.

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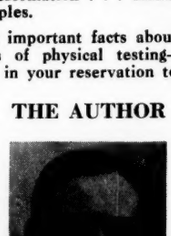

Maxwell Gensamer, associate professor of metallurgy, Carnegie Institute of Technology, is well known to ASM members for his important contributions to the field of physical metallurgy. Also a part-time member of the staff of Carnegie Tech's Metals Research Laboratory, he is well qualified to write on this important subject. His presentation at the Metal Congress was very well attended and undoubtedly many of those who attended will want to get this compact book with the complete illustrated text.

AMERICAN SOCIETY for METALS
7301 Euclid Avenue Cleveland, Ohio

Boston A.S.M. Welcomes New Chapter of A.S.T.E.

Frank Palmer Speaks on Getting Better Production Through Better Tooling

Reported by R. G. Sault
Porter Forge & Furnace Inc.

Boston Chapter—On March 7, at the Hotel Bradford, the chapter joined forces with the American Society for Tool Engineers for one of the most successful meetings of its kind in years.

In this way the A.S.M. greeted the newly formed chapter of the A.S.T.E. and showed the spirit of cooperation that exemplifies not only the ideals of the A.S.M., but of the individual members.

After opening ceremonies under the guiding hand of "String" Downing, past chairman of the Boston Chapter A.S.M., introduction of officers, and dinner, Frank R. Palmer, vice-president, Carpenter Steel Co., was presented to the gathering.

Mr. Palmer proceeded to make clear to all not the difficulties of "Getting Better Production Through Better Tooling" but rather how simple it is, with the present-day tool steels, to gain increased production results through proper selections of the steel for the job on hand.

He rather startled some of the members by upsetting many of the old established ideas on tool steel hardening practice, such as inch-an-hour heating, atmospheres for high speed steel hardening, and other so-called rules.

Approximately 350 members and guests were present to enjoy a pleasant and profitable evening.

Upper Left: Speaker Frank R. Palmer Talks Things Over Informally With Some of the Metallurgists and Tool Engineers at the March Meeting, While Program Chairman A. J. McDuff and Master of Ceremonies and Past A.S.M. Chairman E. N. "String" Downing Entertain the Entertainer, Miss Alice May. Below: President-Elect Young of the A.S.T.E., Frank R. Palmer, vice-president of Carpenter Steel Co., E. N. Downing, A. J. McDuff, and Chairman R. F. Harrington.

Oxygen Is Not Only Oxidizer In Furnace Gas

Reported by Fred P. Peters
Assistant Editor, Metals and Alloys

New Jersey Chapter—The manifold mysteries of protective atmospheres have become casual conversation pieces in and around Newark since J. A. Dow, sales and development engineer of Holcroft & Co., lectured to over 200 members and guests on that topic at the Essex House on March 17.

Mr. Dow emphasized that an atmosphere that contains no "free oxygen" is not necessarily protective, for water vapor and carbon dioxide can be oxidizing or decarburizing to steels in certain temperature ranges. Many "bright annealing" atmospheres made by burning fuel gases with insufficient air are truly non-oxidizing, but their CO_2/CO ratios are not low enough to prevent decarburization of medium and high carbon steels at annealing temperatures.

Thus, with steels of around 0.60% carbon a few tenths of a percent variation in CO_2 in the atmosphere can cause it to have a decarburizing rather than carburizing action when the *carbon monoxide* in the gas is below 35%, as it necessarily is in commercial prepared gases.

Preventing Decarburization

The atmosphere is equally sensitive to water vapor content, and since, when water vapor decarburizes hydrogen is formed, an increase in hydrogen can counteract objectionable water vapor. Decarburizing by the direct combination of hydrogen and carbon is prevented by 1 or 2% of methane. In commercial clean hardening, decarburizing is held to a minimum by holding the CO_2 and H_2O low and keeping the atmosphere "still".

One effective method of producing a non-scaling, non-decarburizing atmosphere is to pass the usual "bright annealing" gas (say 10 CO, 5 CO_2, 2.5 H_2O, 15 H_2) through hot charcoal at 1700° F. An atmosphere is produced that is neither scaling nor decarburizing and which contains no more than 0.1% each of carbon dioxide and water vapor.

Minor Gases Affect Carburizing

In gas carburizing—a very special application of controlled atmospheres—the vital influence of certain minor gas constituents is equally interesting. Here the hydrocarbons are believed to be the real carburizers, in accordance with reactions in which the hydrocarbon breaks up, the carbon combining with the iron and the hydrogen being liberated.

Relatively high percentages of methane are required to carburize actively, because of its relatively sluggish reaction rate. Ethane and propane are more vigorous while butane and quenching and cutting oil fumes are too active to control.

The sluggish action of methane is very desirable since the high percentages necessary are a distinct aid in producing uniform results especially in holes and crevices.

Discussing carbo-nitriding—the process of simultaneously gas carburizing and nitriding steel—the speaker declared that above 1350° F. the rate of case formation and penetration is about the same with the new process as with conventional gas carburizing. The real advantage of carbo-nitriding or "Ni-Carbing" is that ultra-hard cases can be produced at temperatures as low as 1100° F.

Reagan Advocates Lime Charge on Low Side for Basic Open-Hearth Process

Reported by D. M. Horner
Control Supervisor, Harrisburg Steel Corp.

York Chapter—A fitting climax to an unusually successful lecture program was a talk by W. J. Reagan, assistant open-hearth superintendent at Edgewater Steel Co., Oakmont, Pa., on "Basic Open-Hearth Steels" at the meeting on April 9 held in Harrisburg.

Mr. Reagan advocated using an initial lime or limestone charge slightly on the low side of that required for a slag of usual basicity, the actual percentage being dependent upon the amount of silicon in the charge and the composition of the steel being made.

This prevents the difficulties attendant to a lime charge on the high side, namely longer charge to tap time per heat, more viscous slags, and higher than desired FeO in the slag and consequently in the bath. The last is of special importance since it is much easier to build up FeO in the slag by the proper use of mill scale than it is to reduce an FeO which is too hgh.

However, the slag naturally must be kept sufficiently basic to prevent reversion of the phosphorus from the slag to the bath in case silicon is to be used for deoxidation.

Mr. Reagan analyzed the problem of complete slag control, consisting of the chemical determination of true and total FeO in the slag, lime silica ratio, and the use of the viscosimeter and of slag pancake tests. It was interesting to note that the speaker always planned to use at least a small amount of ore in the early part of the refining period to help condition the slag.

The various types of deoxidizers were discussed, together with the types and relative sizes of oxide inclusions.

The results of both varying slag compositions and deoxidation practice were well illustrated by a number of graphs taken from Mr. Reagan's nearly inexhaustible supply of data. In general, these results seemed to indicate that the average heat of steel now being made could be improved in quality by the use of more deoxidizers, since this would reduce not only the number but also the size of the non-metallic inclusions.

In general, Mr. Reagan stated that optimum conditions in the control of basic open-hearth steels would probably not be reached until the actual temperature of the bath in the furnace could be accurately determined and this information properly correlated with the present system of slag control now in general use.

Progress in this direction is now being made, but it may be some time before it is possible to set up a general practice on this basis.

Steel Castings Talk Given

Reported by Virgil O. Becker
Student, Missouri School of Mines

Missouri School of Mines Group—Meeting on April 2 for the installation of new officers, the Group had R. W. Erwin, chief chemist for St. Louis Steel Casting Co., as guest speaker.

Mr. Erwin's topic was "Steel Castings." A short history of the manufacture and uses was given, and the various types of furnaces and methods of making carbon and alloy steel castings were described.

Carbon and alloy steels manufactured were classified and methods of cleaning the castings and heat treatment described. Uses and tests were enumerated.

Aircraft Engines Average About 1 Lb. Per Hp.—Heath

Reported by H. R. Boatman
Metallurgist, Inland Steel Co.

Calumet Chapter—At the dinner meeting on April 15 the local Chapter was host to the Notre Dame Chapter.

The East Chicago Male Chorus entertained with a collection of songs after dinner, and R. L. Heath, chief metallurgist of the Allison Engine Division of General Motors Corp., delivered a lecture on "Metals Used and Reason for Their Selection in Aircraft Power and Transmission Units".

The interest of the audience was aroused by Mr. Heath's statement that aircraft engines now average about 1 lb. per horsepower. This he said has come about largely through design and liberal use of alloy steels, aluminum alloys, magnesium alloys, die castings, and forgings instead of castings.

Sections normally about 1 in. thick in automobile engines are ⅛ to ½ in. thick in aircraft engines.

The most commonly used types of steel are S.A.E. X4340 for shafting, connecting rods, etc.; S.A.E. 3135 or 4640 for studs and bolts; and S.A.E. 3312 or 4615 for gears or pinions.

A typical aluminum alloy analysis used for crankcases and cylinder heads was given as 5% Si, 1% Cu, 0.5% Mg, 93.5% Al. Magnesium alloys are used only where not subjected to too great a temperature.

Corrosion, Mr. Heath said, is one enemy all aircraft engine manufacturers have found it necessary to battle against. Steel parts are usually protected with cadmium plate. Magnesium and aluminum are protected by oxide coatings or are anodized. Magnesium alloys are given a dichromate finish.

Helpful Literature — Mail Coupon Below

Milling Head
How to make a milling machine of your lathe in less than three minutes is explained in a folder describing a milling attachment manufactured by the Globe Products Manufacturing Co. Bulletin Ee-309.

Drycolene
A new publication about Drycolene, a balanced blend of gases for use as a protective atmosphere in heat-treating furnaces, describes the many unusual features of this new General Electric development. Bulletin Ee-60.

High Speed Hardening
High quality from unseasoned labor is one of the reasons why men confronted with steel hardening problems will be interested in a new method developed by The Sentry Co. and explained in their folder. Bulletin Ee-114.

Industrial Baskets
A handbook for shop executives and purchasing agents showing 50 types of construction and design of welded industrial baskets has been printed by Rolock, Inc. Bulletin Ae-299.

Park-Kase
A leaflet by Park Chemical Co. contains complete information concerning a liquid carburizer of rapid and uniform penetration. Unique features and advantages of the bath are backed up with technical data. Bulletin Na-141.

Brazing Alloys
How you can put your metal joining on a sound, economical basis is explained in a folder just released by Handy & Harman. Well illustrated and full of facts. Bulletin Ic-126.

Contour Machine
An unusual file-size spiral bound book containing a wealth of information on contour cutting is offered by Continental Machines, Inc. Bulletin Ee-170.

Arc Welding Electrodes
A new 24-page, pocket-size pamphlet on its Murex line of arc welding electrodes describing the welding characteristics and other properties is now available through Metal & Thermit Corp. Bulletin Ae-64.

Heat Resisting Alloys
Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Refinery Alloys
Special alloys for refineries, corrosion, temperature, and abrasion resisting are covered in a colorful folder produced by the Duraloy Co. Bulletin Kd-233.

Aluminum Bronze
"Controlled Aluminum Bronze for Aircraft Parts" is the title of a 12-page booklet just issued by Ampco Metal, Inc., reprinting an article by Mr. George K. Dreher which appeared in METAL PROGRESS recently. Bulletin Ee-175.

Cutting Oils
An interesting new booklet, "Metal Cutting Lubrication—In Theory and Practice", has just been made available by Cities Service Oil Co. Bulletin Ec-113.

New X-Ray Unit
An X-ray diffraction unit, smaller and more versatile than previously available outfits of this type, is described in a comprehensive folder released by the General Electric X-Ray Corp. Bulletin Hc-6.

Multi-Point Pyrometer
The Alnor Rectangular Type Pyrometer, designed to provide a rugged moderately priced instrument with multi-point switch, is described in a release by the Illinois Testing Laboratories, Inc. Bulletin Dc-180.

Micro-Optical Pyrometers
A new instrument which permits measuring the temperatures of very small objects such as incandescent lamp filaments, etc., and for laboratory and scientific research work has been developed by the Pyrometer Instrument Co. Bulletin Kc-37.

Band Saws
Actual performance records for DoALL Band Saws are contained in a booklet made available by the DoALL Co., Inc. Bulletin Ae-297.

Condensed Catalog
A new condensed catalog covering most of their control instruments in a comprehensive manner has been made available by Wheelco Instruments Co. Bulletin Ee-110.

Laboratory Appliances
A line of laboratory appliances whose resistance to corrosion by laboratory fumes insures a long, useful life and attractive appearance is described in a colorful folder released by the Burrell Technical Supply Co. Bulletin De-213.

Modern Polishing
Just off the press by Tracy C. Jarrett is a new booklet describing a simplified and improved technique which enables even inexperienced operators to turn out large quantities of polished specimens. Bulletin De-303.

8-Steel Tool Kit
A compact set of 8 shop-proved tool steels that will handle 90 per cent of the jobs in any plant are outlined by The Bethlehem Steel Co. Bulletin Hd-76.

Ground Shafting
A colorful folder describing Ground Shafting made by Bliss & Laughlin, Inc., is now available through this company. Pictures steps in shafting production. Bulletin Bc-42.

Cr-Ni-Mo Steels
A. Finkl & Sons' catalog is really a technical treatise on chromium-nickel-molybdenum steels for forgings. Pocket size, 104 pages, cloth bound, illustrated by photographs, charts and tables. Bulletin La-23.

Stainless Clad
IngAclad Stainless-Clad Steel is covered in detail by a booklet issued through Ingersoll Steel & Disc Division, Borg-Warner Corp. Bulletin Kc-253.

Meehanite Castings
An interesting, well-illustrated 49-page booklet, "Meehanite in Industry", covering applications of Meehanite caastings in a variety of industries is now available through the Meehanite Research Institute of America, Inc. Bulletin Ce-165.

Annealing Furnace
The interesting "Top Hat" Cover Annealing furnace perfected by Continental Industrial Engineers, Inc., is described in a bulletin of value to furnace users. Bulletin Nc-154.

Mo-Max Steel
A 24-page booklet describing the Molybdenum-Tungsten high speed steels marketed under the general trade name "Mo-Max" is available through the Cleveland Twist Drill Co. Bulletin De-103.

18-8 Types
Properties, fabrication, corrosion-resistance and applications of Republic Steel Company's ENDURO 18-8 are covered in a new 24-page booklet. Bulletin Be-8.

Electric Furnaces
A four-page bulletin on ½ lb. to 4 lb. high frequency melting furnaces and 3 kw. converter is now available through the Ajax Electrothermic Corp. Bulletin Dd-41.

Open-Hearth Bottoms
A practical way to save time with safety by resurfacing open hearth bottoms regularly with a quick-setting magnesite refractory is explained in an attractive folder released by Basic Refractories, Inc. Bulletin Ee-192.

Hardening Furnace
A pamphlet which describes "Certain Curtain" furnaces made by C. I. Hayes, Inc., will be particularly interesting to those with hardening problems. Bulletin Nc-15.

Furnaces—Ovens
Forced convection heat treating with recirculation is the principle which distinguishes the line of furnaces and ovens for heating, drawing, annealing manufactured by the Morrison Engineering Corp. Bulletin De-305.

Core Making, Baking
A very striking new 14-page folder released by the Despatch Oven Co. will be helpful to those engaged in core making and baking because it explains fundamentals of good core making and shows better ways of handling cores. Bulletin Ee-123.

Steel Data
Ten colorful leaflets each describing a popular grade of tool or high speed steel and giving useful data, application information, etc., have just been issued by Vanadium-Alloys Steel Co. Write for Bulletin Kd-294.

Free Machining
Reserve your copy of new twenty-page story of Speed Case and Speed Treat. This booklet covers physical properties, compares this W. J. Holliday & Co. steel with SAE 1020 and others. Explains how manganese and sulphur content plus patent manufacturing processes produce free machining combined with comparatively high physical values. Also contains machinability carburizing tables and pictures applications. Bulletin Kd-293.

Salt Bath Furnace
"As modern as radio-beam control" says the attractive folder put out by Commerce Pattern Foundry & Machine Co. about the Upton electric salt bath furnace. A brief but informative article on "The Importance of Temperature" by R. C. Upton is included. Bulletin Ed-266.

Furnace Experience
Facts developed through 32 years of engineering and building practically every type of industrial fuel equipment can be obtained through Flinn & Dreffein Co. Bulletin Bc-82.

Pit Handbook
A virtual handbook on soaking pit procedure best describes a booklet published by Amsler-Morton Company. Included are comprehensive case histories of pits now in successful operation. Bulletin Kd-286.

Diecasting Machines
A new high-pressure hydraulic diecasting machine specifically designed to solve modern production problems is illustrated and discussed in an imposing new folder by the G & N Mfg. Co. Bulletin Ee-308.

Cadmium Plating
Concise, practical information for the operating plater is included in an up-to-date manual on cadmium plating released by E. I. DuPont de Nemours & Co., Inc. Bulletin Hd-29.

Rocker Barrels
The operation of cleaning miscellaneous items of gray iron, steel, semi-steel malleables, forgings, plate, bars, bronze and other castings by the Airless Rotoblast method is described fully in a handsome booklet by the Pangborn Corp. Bulletin Ae-68.

New Cleaning Process
A new process for cleaning brass, copper and zinc alloys before plating to provide better removal of oil, grease, smutty deposits and soap films to assure better plate adhesion is described in Oakite News Service, house magazine of Oakite Products, Inc. Bulletin De-296.

Salt Bath Furnace
New 20-page Catalog describing the Ajax-Hultgren Electric Salt Bath Furnace. Gives detailed data on all heat treating applications such as carburizing, cyanide hardening, hardening carbon and high speed steel tools without scale or decarb, heat treating aluminum alloys, tempering steel products, heating for forging, brazing, etc. Bulletin Nd-43.

Refractory Cement
An economical silicon carbide cement for general service in furnace linings is described in a colorful folder released by the Norton Co. Bulletin Be-88.

Furnace Catalog
A 120-page catalog covering the complete line of furnaces and burners manufactured by The American Gas Furnace Co. is available to companies who request this book through THE REVIEW on their company letterhead. Bulletin Be-11.

Mounted Wheel Chart
A convenient ready reference wall chart showing mounted grinding wheels should be of great advantage in the cleaning room, pattern shop, tool and die room, and many other places. It gives at a glance, by means of detailed drawings, actual size, the exact radius of each wheel and its exact shape. Chicago Wheel & Mfg. Co. Bulletin Bd-230.

Thermocouple Head
Thermocouple heads and parts are covered in literature by Claud S. Gordon Co. Bulletin Be-53.

Hard Facing Alloys
For maximum resistance to wear and corrosion, the Wall-Colmonoy Corp. offers a fact-packed folder which is extremely helpful to anyone having this problem. Bulletin Kd-85.

Heat Treat Chart
Heat treaters everywhere should find a heat treating wall chart complete with S.A.E. specifications a very valuable addition to their shops. Published by Chicago Flexible Shaft Co., manufacturers of Stewart industrial furnaces. Bulletin Ka-49.

Welding Alloys
New low temperature welding alloys which bind by eutectic low temperature reaction to give stronger joints are described in literature available through Eutectic Welding Alloys, Inc. Bulletin Be-301.

Cecostamp
A high production, impact-type stamping machine developed for forming stainless steel, thin hot work that cools quickly, embossing, and work hard to set to final shape is described in an instructive 16-page booklet by the Chambersburg Engineering Co. Bulletin Gc-132.

Quenching Handbook
Quenching oils for every required speed, every need are described in the valuable new Quenching Handbook printed by E. F. Houghton & Co. Bulletin Ce-38.

Carbide Tools
"Firthite General Purpose Tools" is the title of a new bulletin and price list available from Firth-Sterling Steel Co. Bulletin Ae-177.

Recorder-Controllers
Foxboro's new booklet describes the permanent precision, low maintenance and reductions in spare-parts inventories for Potentiometer Recorders and Recorder-Controllers. Bulletin Kd-21.

Steel Data Sheets
Wheelock, Lovejoy & Co. gives analyses, physical properties, heat treating instructions, and applications of Hy-Ten, Economo, and S.A.E. alloy steels in concise and easily usable form. Bulletin Ox-74.

N-A-X
New twenty-page, fully illustrated booklet on N-A-X high tensile low alloy steel has just been published by Great Lakes Steel Corporation. This steel has been thoroughly proved in application where ordinary high tensile steels have failed. Bulletin Kd-229.

Industrial Furnaces
Furnaces of all types are fully described in technical bulletins made available by the Eclipse Fuel Engineering Co. Bulletin Hc-226.

Welded Stainless Tubes
A really striking 16-page booklet containing 45 illustrations on Welded Stainless Tubing is offered by the Carpenter Steel Co. Bulletin Kd-12.

Metal Heating
Improvements in furnace economies, operating conditions and appearance, furnaces that will more satisfactorily meet old requirements or handle new processes, service that will help solve the most stubborn problems are offered and described by Mahr Mfg. Co. in Bulletin Ea-5.

Aircraft Heat Treating
A special bulletin "Heat Treating Furnaces for the Aircraft Industry" has just been prepared by the Lindberg Engineering Co. Bulletin Nd-66.

Insulating Firebrick
An insulating firebrick with low weight, low heat losses, and great economy is described in detail in a new bulletin by the Babcock & Wilcox Co. Bulletin Ce-75.

Hi-Speed Furnace
An essential unit for general machine and tool shops is the Hi-Speed Steel Furnace described in literature by Johnson Gas Appliance Co. Bulletin Ae-298.

Heat Treating Furnaces
A brand new 16-page booklet of Holcroft & Company shows and describes their line of controlled atmosphere heat treating furnaces. Bulletin Ec-203.

Super Refractories
A catalog of Chas. Taylor Sons Co. is replete with useful data on P. B. Sillimanite refractories for use up to 3300° F. in electric furnace roofs and linings, induction furnaces, crucible furnaces, fuel-fired hearths, piers and linings, burner blocks, etc. Bulletin Ec-218.

Industrial Carburetor
The flame characteristics most suitable for your operation is accurately supplied by the Kemp line of Industrial Carburetors which is described in a colorful folder furnished by the C. M. Kemp Mfg. Co. Bulletin Ce-219.

Conveyor Furnaces
Chain belt conveyor furnaces, their design, construction and application, are covered in a 12-page reprint of an article showing furnace details and containing over 30 illustrations of electric and fuel fired chain belt furnaces. Issued by The Electric Furnace Co. Bulletin Be-30.

No Decarburization
A low cost method of hardening and annealing under production conditions with no decarburization is described in technical data available through Westinghouse Electric & Mfg. Co. Bulletin Fd-134.

Metal Descaling
A process which overcomes past descaling disadvantages through a new method which removes scale completely without the slightest damage to the work is introduced in a folder by the Bullard-Dunn Process Division of the Bullard Co. Bulletin Ld-143.

Carbon Determinator
A colorful booklet describing a two-minute carbon determinator and sulphur determinator for use in accurate determination of these materials in ferrous and non-ferrous materials is available through the Harry W. Dietert Co. Bulletin Ce-198.

Remote Transmission
Remote Transmission for indicating, recording and control of temperature, pressure, flow and liquid level in hazardous atmospheres where the use of electrical transmission is not desirable nor permissible is introduced in a new booklet by the Brown Instrument Co. Bulletin Ce-3.

Abrasion Resistance
An efficient, portable testing machine for evaluating resistance of surface finishes to rubbing abrasion has been developed by the Taber Instrument Co. Bulletin Ce-303.

Carburizing Boxes
Carburizing boxes that reduce heat treating costs and possess stubborn resistance against heat-corrosion and hard service are illustrated in a folder released by The Pressed Steel Co. Bulletin Ce-269.

Machinery Steel Selector
A handy chart giving complete physical characteristics with variations up to 8" cross-sections, machining data, etc., on the ELASTUF group of Related Machinery Steels is available through Horace T. Potts Co., Brown-Wales Co., and Beal McCarthy & Rogers. Bulletin Ed-264.

Durodi
Durodi . . . "The practical, serviceable and economical hot work steel" . . . is described in a catalog issued by A. Finkl & Sons Co. Points out uses and characteristics of this alloy. Bulletin Ib-23.

Carburizer Cleaner
A machine for cleaning used carburizer so as to increase its life 50% is illustrated and described in a booklet by the Thurner Engineering Co. Bulletin Ae-300.

Government Specifications
A handy digest of 23 Army and 17 Navy specifications for alloy steels, showing chemical analysis and corresponding SAE number for each specification is now available through Peter A. Frasse & Co., Inc. Bulletin Ce-172.

Deposition Date
A graph which helps you estimate accurately quantity of electrodes needed and welding time required . . . data on Cr and Cr-Ni alloy weld metals: types of service for each grade and recommended heat treatment . . . has just been released by the Arcos Corp. Bulletin Ld-191.

The Review
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Harder Talks on Bearings At Cleveland Chapter Officers' Night on April 7

Reported by A. E. R. Peterka
Metallurgical Engineer, Lamson & Sessions Co.

Cleveland Chapter—April 7 was the annual National Officers Night. Naturally, we missed Bill Eisenman, who was out on the Pacific Coast arranging for the Western Metal Show. However, President O. E. Harder, and Treasurer Kent Van Horn, did a very creditable job of "pinch hitting" for Bill.

In addition to the bedtime story hour Messrs. Harder and Van Horn gave the Cleveland Chapter an over-all picture of the progress and plans of the national organization.

The feature address of the evening was Dr. Harder's lecture on Bearings and Bearing Metals. Dr. Harder, who is assistant director at Battelle Memorial Institute, is a favorite speaker of the Cleveland Chapter, as evidenced by the fact that this was his fourth lecture before this group.

A most animated discussion took place after the lecture, in which the technical chairman of the evening, Dr. Carl E. Swartz, metallurgist of the Cleveland Graphite Bronze Co., actively participated.

Quiet Gears Usually Are Good Otherwise

Reported by James C. Erickson
Deere & Co.

Tri-City Chapter — R. J. Peters, metallurgist, Warner Gear Division, Borg-Warner Corp., Muncie, Ind., addressed members and guests at the March meeting, held at Rock Island, Ill., with an interesting talk entitled "Gears". The speaker substituted for E. F. Davis of the same company who was unable to attend the meeting.

To transmit power efficiently, a gear must perform quietly with a minimum of wear, and must not break under working loads. If the gear operates quietly, it will usually be satisfactory in all other respects.

The use of proper materials, good bearing conditions, and proper hardening practice lead to quiet, durable gears. Mr. Peters stated that gears have even been made to operate so quietly that the oil swish became audible, thus requiring improved lubrication methods.

The choice of proper gear material involves careful consideration of shop equipment, design of the gears, and economics.

A film entitled "Army on Wheels" was shown preceding the meeting.

HERE AND THERE WITH A.S.M. MEMBERS

MAJOR FRED M. REITER, formerly industrial gas engineer, Dayton Power & Light Co., and past secretary of the Dayton Chapter, has concluded the course of instruction at the Army Industrial College in Washington, D. C., and has been assigned to duty in the Pittsburgh Chemical Warfare Procurement District. Major Reiter is serving a year's tour of duty as a reserve officer.

The Army Industrial College trains selected officers of the Army, Navy and Marine Corps in the solution of problems peculiar to the procurement of munitions. The class in which Major Reiter was graduated was the twenty-first in the history of the College and the first class to be composed entirely of reserve officers.

* * *

A. H. FRAUENTHAL, vice-president and general manager of the Bantam Bearings Corp., has tendered his resignation in order to establish a new factory in Muskegon, Mich., to manufacture large special roller and ball bearings, as well as aircraft parts.

During recent months Mr. Frauenthal has been acting as consulting engineer for other manufacturers in getting them started on defense contracts.

He has been with Bantam since 1930, and previously held responsible positions with General Electric Co., Chandler Motor Car Co. and the Studebaker Corp. Mr. Frauenthal is the author of a number of technical papers and holds many patents on anti-friction bearings and on an outstanding precision measuring instrument.

* * *

SYMPATHIES are extended to Chairman C. H. LORIG of the Columbus Chapter on the death of his brother on April 13 in a highway accident near Madison, Wis.

* * *

R. S. MARTHENS, who joined the Westinghouse organization as a youth, studied engineering at the Westinghouse Technical Night School, and from 1917 on has been a member of various engineering divisions of the company, has been appointed staff assistant to the manager of the Canton Ordnance Division, Westinghouse Electric & Mfg. Co.

The Canton plant, which is under construction at present, will be operated by Westinghouse and owned by the U. S. Government.

Marthens' first assignment was in the power engineering department at East Pittsburgh, where he remained until 1930, when he was transferred to the Gearing Division as section engineer. In 1932 he was made manager of engineering for the division, and in 1934 was appointed Gearing Division manager, holding this position until his present appointment.

* * *

IN ORDER to have a consultant available for work having to do with the application of arc welding in the national defense program, the Lincoln Electric Co. of Cleveland has appointed B. J. BRUGGE as its welding consultant and engineer at Washington, D. C. He will be associated with T. A. Canty, Inc., Lincoln representative in Baltimore, Md.

B. J. Brugge

Mr. Brugge is a graduate of Purdue University and began his career in arc welding with two years in the Lincoln research laboratory. In 1935 he was granted a leave of absence to serve as welding superintendent for the Anglo-Iranian Oil Co., and spent two years at Iran, Persia, supervising welding operations in construction of refineries and pipe lines. Following this he spent four months in the British Isles as welding consulting engineer for British and Scottish firms.

Mr. Brugge has been with Lincoln since 1931, formerly in the Los Angeles office and more recently in Houston, Texas.

* * *

BECOMING departmental metallurgist for the Canadian Department of National Defense in May 1939, H. H. BLEAKNEY was immediately sent to the Royal Small Arms Factory in England to study the metallurgical features of the Bren gun production. He returned in June and was stationed at the plant of the John Inglis Co. in Toronto, which was making Bren guns in Canada.

Shortly after the outbreak of the war he was moved to Ottawa, where he was in charge of the inspection of materials in the Chief Inspector of Armaments branch.

Recently the Canadian inspection service and that of the United Kingdom Technical Mission were merged, and not satisfied that his experience would be fully utilized, Mr. Bleakney accepted the position of chief metallurgist with the newly formed Federal Foundries and Steel Co. at London, Ontario.

Technical Sessions And Dinner Dance On Two-Day Program

(Continued from page 1)

concerned some very interesting experiments conducted in the Crucible Steel Co.'s laboratories on the toughness of high speed steels as influenced by heat treatment.

The afternoon session was followed by a dinner at Todd Union, at which the coffee talkers were National President O. E. Harder and Assistant Secretary Ray T. Bayless.

The progress of the society through the years was related by Dr. Harder, and Mr. Bayless discussed the promotion of education.

At the evening technical session in Strong Auditorium, University of Rochester, Dr. Harder spoke on "Physical Metallurgy of Yesterday, Today and Tomorrow".

The Saturday morning session was opened with a "Classification of Tool Steels and Hardening Methods" by Donald Roda, Rochester Products Division, General Motors Corp. Mr. Roda discussed each grade of tool steel and its heat treatment from a practical application point of view.

Three A's of Ordnance Given

"The Applications of the Spectrograph in Industry" was the title of a second paper by K. J. Mackenzie of the International Business Machines Corp.

An interesting informal talk on his experience as a trouble shooter for the Talon Co. in the practical application of slide fasteners to such items as men's, women's and children's clothing was then given by W. E. Craig, engineer of the Talon Co.

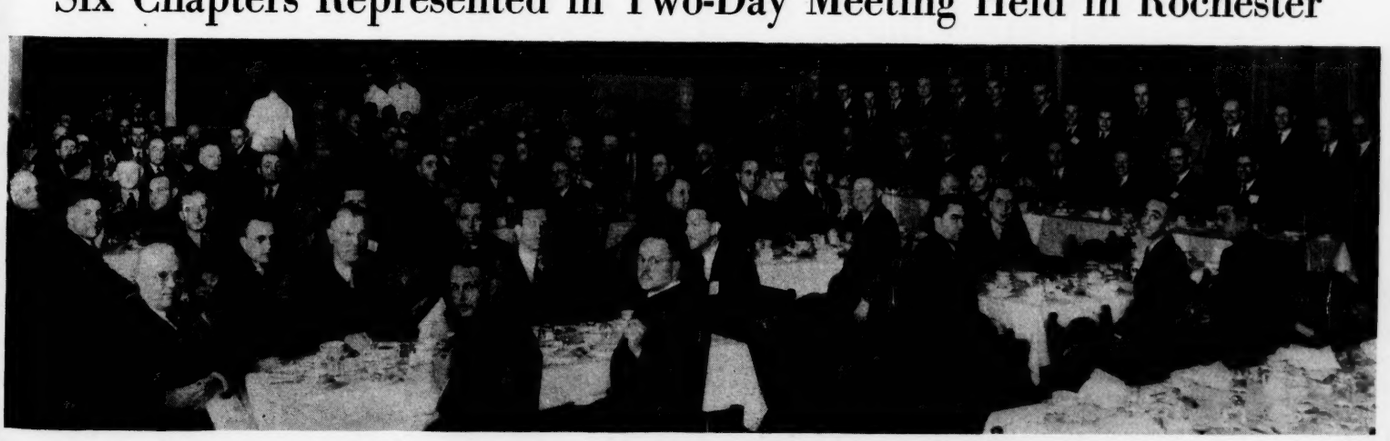
At the luncheon meeting the speaker was G. B. Lofberg, naval inspector of ordnance, and the subject was "Metals in Ordnance". The speaker spoke interestingly on the three A's; namely, armor, armament and ammunition, as applied to naval guns and equipment.

The afternoon paper was the final paper of the session and was a discussion and demonstration of Magnaflux inspection equipment presented by C. E. Betz of Magnaflux Corp.

The final event on the program was a dinner dance on Saturday evening held at the Sagamore Hotel, and attended by 113 couples. It was a lively evening, from the cocktail session through the dinner, floor show, dancing and cards.

This is the first event of the Rochester Chapter in which the ladies have been included and from the comments received, it will undoubtedly become one of the Chapter's annual affairs.

Six Chapters Represented in Two-Day Meeting Held in Rochester



A Dinner Was Held at Todd Union, University of Rochester During the Second Annual Regional Meeting of the Rochester, Buffalo, Ontario, Syracuse, Northwestern Pennsylvania and Southern Tier Chapters on Friday and Saturday, April 18 and 19

Die Castings Made Possible By 99.99% Zinc

Reported by Philip C. Rosenthal
University of Wisconsin

Milwaukee Chapter—Zinc, for many years, has been attending a masquerade, wearing costumes that have proved so deceptive that its importance in industry is not always recognized. Such disguises as galvanized iron, spelter, and lithopone indicate how this deception has been carried on.

R. F. Burns

With this introduction, Ralph F. Burns, sales engineer for New Jersey Zinc Sales Co., led the members to a better understanding of zinc, through his talk on "Special High Grade Zinc, Its Production and Use in Zinc Base Die Casting Alloys" at the April meeting.

Starting with the history and description of the reduction processes, Mr. Burns showed that while the zinc produced by a reduction in retorts is pure enough for many industrial requirements, it was only with the advent of the 99.99+% grade produced by fractional distillation or electrolytically, that the field of use was extended to include zinc base die castings. Of the more than 600,000 tons of zinc produced, about one-fifth is of the special high grade analysis.

Zinc now occupies such an important place in the die casting field that approximately three-fourths of these castings have a zinc base.

The alloy elements and their amounts used in addition to zinc to obtain desirable die casting properties include about 4% aluminum, up to 3% copper and about 0.04% magnesium. Each of these performs a necessary function.

Aluminum adds strength, ductility, and fluidity, and by the formation of low specific gravity iron-aluminum compounds insures removal of excessive iron in the alloy.

The zinc-aluminum series is subject to intergranular corrosion. This corrosion can be minimized by the addition of an element such as magnesium which acts as an inhibitor, and the use of special high grade zinc which is low in contaminating impurities.

Copper confers tensile strength, creep resistance, and hardness, but also introduces some aging changes with some increase in tensile and hardness, but some loss of dimensional stability.

Mr. Burns discussed the effects of other alloying elements in addition to these three, but none of them contributed enough improvement to the zinc die casting alloy to warrant their use.

Romance in Gas Seen In Many Developments

(Continued from page 1)

manufactured in larger quantities than any other gas. It has more than 900 uses, including fire extinguishing equipment and the production of carbonated beverages.

The standard sizes of seamless cylinders used for gas containers vary from 34 cu. in. to 5775 cu. in. water capacity with working pressures up to 4000 psi.

The weight of the containers used has been decreased in the last 30 years to only a little over half the original weight, by the use of medium manganese and S.A.E. X4130 steels. This is an important factor in the cost of the gas because of the cost of transportation involved.

These containers are manufactured according to strict specifications required by the Interstate Commerce Commission and administered by the Bureau of Explosives of the Association of American Railroads.

Employment Director Advises Graduates

As the tempo of the defense program is being accelerated, the situation for young men graduating from college becomes more complex, according to a statement by T. G. Protheroe, director of Technical Placement Service, 405 Swetland Building, Cleveland, National A.S.M. Employment Headquarters.

Usual rules and procedures for hiring and training of graduates are being disregarded by many employers this spring. There does not seem to be any disposition, on the part of employers, to undertake the training of young men, no matter how promising, who are likely to be called to military service.

"However, there are advantages not to be overlooked in these uncertain days," Mr. Protheroe advises graduates, "and there will be more time to get set for your life's work, to understand yourself better, your abilities, talents, and temperament. Then, too, you may have a better opportunity to learn all you should know about the area or field of work you desire to enter, how to get results from letters and advertising, and how to prepare for and conduct an interview.

"In other words, there is much you can do, now, to solve your life's work problem, by carefully planned approach rather than 'trial and error' methods."

Ford Engineer Tells Function of Industry In American Scene

Peoria Chapter — Organized on a small town and small business basis, the United States will never support a dynasty—money, business or political—W. J. Cameron, engineer and radio commentator for the Ford Motor Co., told 500 members and guests at the meeting on April 24.

What we need most of all, he declared, is a "revival of personal and independent thinking." The paths followed in the past lead somewhere, but the new ones we are following today lead to dead ends "and we may have to cross the fields to find the highway again."

Mr. Cameron blasted the "new economic wizards, who believe it is industry that supports people, when the fact is that people support industry," and painted a glowing picture of the American business and industrial scene and the civilization that has been built around it.

The function of industry, of that 20 per cent of the employed persons, is to supply the things the other 80 per cent need and use to get their living with, and behind each of the 30,000 ways the American people have to earn a living is an industry, he stated.

"We don't realize what a real, what a natural thing business is," he said. "Nothing good that has ever been developed in this country is ever superseded." Railroads now face the competition of trucking concerns, but the day will come when each is calling on the other for help, and so with other phases of American business, he predicted.

The 10-hour day, child labor restrictions and other advancements have been pioneered by business and industry because they have listened to their job, he stated. He foresaw a revived understanding and new respect for the mechanic in American industry, adding that now the working man gets higher wages for less back breaking work while the consumer gets better products for less money.

The speaker was introduced by T. J. Connor, vice-president in charge of production at the Caterpillar Tractor Co. J. R. Munro was chairman of the meeting and Chapter Chairman C. A. Davis, Jr. spoke briefly.

2% Copper Makes Manganese Ductile

Reported by E. J. McKnight
Time-keeper, Griffin Wheel Co.

Rocky Mountain Group — Although illness prevented R. S. Dean, chief engineer of the Metallurgical Division, U. S. Bureau of Mines at Salt Lake City, from giving a talk on "Electrolytic Manganese", his assistant, C. Travis Anderson, acted as his substitute at the March meeting.

The talk was confined to electrolytic manganese as a non-ferrous metal. Pure manganese is brittle, but the addition of as little as 2% copper transforms it from a brittle material to one which is malleable and ductile. From properties determined on high manganese alloys and by extrapolation to the pure form tensile strengths up to 48,000 psi. in the soft state, to 75,000 psi. cold worked, and hardness of Rockwell B-55 are obtained. It can be forged, spun, rolled or drawn.

A number of other elements have been alloyed with manganese and manganese-copper, especially nickel, and some interesting and useful alloys found.

Among the numerous samples and slides shown were two bars, about 1 ft. long and ¼ in. across, one of steel and one of slowly cooled manganese-copper. When thrown upon a table the steel bar rang like "coin of the realm" while the other sounded like counterfeit—this to illustrate damping capacity.

V. H. Gottschalk, senior physicist of U. S. Bureau of Mines at Salt Lake, was a visitor and gave a short talk. A motion picture, "Desert Empire", showing points of interest in the "Bee Hive State" completed an evening devoted to our neighbors in Utah.

Employment Service Bureau

Address answers care A. S. M., 7301 Euclid Ave., Cleveland, unless otherwise stated

YOUNG GRADUATE METALLURGIST: With practical knowledge of the processing of stainless steels. Should be experienced in the investigation of metallurgical problems of stainless steels in production and development. State training, experience and salary. Box 5-5.

YOUNG METALLURGICAL or mechanical engineer: Graduate, qualified for general and research machinability work on stainless steels. Some knowledge in operation of machine tools desired. State training, experience and salary. Box 5-10.

METALLURGIST: Married man preferred, age 25 to 40; college trained in metallurgy. Good personality for customer contact and participation in technical meetings; plant experience on gray iron, malleable, and steel castings. Box 5-20.

METALLURGICAL ENGINEERS, Engineering Draftsmen, Procurement Inspectors for Aircraft: The United States Civil Service urgently needs men in these categories. Details concerning application forms for Civil Service examinations can be secured from the United States Civil Service Commission in Washington, D. C., or from the Secretary, Board of United States Civil Service Examiners, at any first or second-class post office.

ENGINEER: M.E. or E.E.; age 23 to 35. To run tests and develop improved design; eastern plant making measuring instruments. U.S. citizen and Christian faith. Box 5-25.

CHIEF METALLURGIST: Experience in hot-rolled bar stock from high alloy electric furnace steel; permanent position. Canada. Box 5-30.

METALLURGIST: Assistant to chief; graduate, about five or six years out of school. Experience in steel forging products. Box 5-15.

ANALYTICAL CHEMIST: Recent graduate; one or two years experience in ferrous and non-ferrous analysis. Opportunity for advancement in non-routine testing. Box 5-35.

METALLURGIST: Assistant to chief of research department; age 35 to 40. Some knowledge of steel castings, alloy steels, heat treating, sand mixtures for molds. Should be able to make contacts for defense contracts. Box 5-40.

ASSISTANT INSTRUCTORS (2): For School of Mines; no teaching experience necessary. Also one man with training and experience in physical metallurgy and applied X-rays. Box 5-45.

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